

What is claimed is:

1. A portable, compact, aerosol contaminant extractor comprising:
  - a) a housing with inlet and outlet ports for admitting air to be sampled and discharging same after sampling;
  - b) an ionizer for charging aerosols in the air which passes therethrough from said inlet port;
  - c) a removable collector substrate having a surface for collecting charged aerosols and ground plates, said collector substrate being positioned between and spaced apart from the ground plates, said plates being parallel to each other and being positioned so that air which has passed through the ionizer will pass between said plates, said collector substrate being maintained at a potential sufficiently higher than ground to effect the collection of charged aerosols;
  - d) power supply means for maintaining high voltage for said ionizer and for said collector substrate;
  - e) means for moving the air through said inlet, ionizer, ground plates and collector substrate at a measured rate and discharging same through said outlet port; and,
  - f) an access port in said housing positioned so that when opened; said collector substrate may be removed so that aerosols collected on the surface of said substrate may be analyzed.
2. The aerosol contaminant extractor of claim 1 wherein the collector substrate is a plate.

3. The aerosol contaminant extractor of claim 2 including storage means within the housing to store additional collector substrate plates.

4. The aerosol contaminant extractor of claim 1 including an external electrical power receptacle on a surface of said housing, said receptacle being electrically connected to said fan and to said high voltage supply means, and an external battery with means for connecting to said receptacle.

5. The aerosol contaminant extractor of claim 1 wherein said housing is of a generally rectangular parallelepiped shape and having a weight of less than about 15 pounds.

6. The aerosol contaminant extractor of claim 1 wherein the collector substrate comprises a metal foil which may be moved into and out of said extractor.

7. The aerosol contaminant extractor of claim 1 wherein the collector substrate comprises a tape having at least one thin conductive metal sheet adhered thereto.

8. The aerosol extractor of claim 1 wherein the collector substrate comprises a plastic sheet upon which conductive metal particles have been deposited.

9. The aerosol extractor of claim 1 including means for moving said substrate into and out of said housing.

10. A portable, compact aerosol contaminant extractor comprising:

a) a longitudinal tubular ionizer section having inlet and outlet ends to permit the flow of air therethrough, the wall of said tube comprising an electrically conductive material, said conductive wall serving as an anode;

b) a cathode wire longitudinally positioned in the center of said ionizer section, the dimensions of said wire and tube being selected so that when the

potential difference between said tube wall and said cathode is of about at least 8,000 volts a coronal glow discharge will be established;

c) a generally rectangular, electrically conductive, removable collector substrate having a plate-like surface for collecting aerosol contaminants;

d) a collection chamber having an inlet adapted to receive air discharged from the outlet of said ionization section, said chamber having two opposed ground plates having insulated plate support means associated therewith for holding and removably securing said collector substrate there between, said substrate and ground plates being mounted parallel to the direction of the flow of air through said chamber, said substrate being maintained at a potential of at least about 8,000 volts above the ground plates to collect airborne particulates that have been ionized by said coronal glow discharge;

f) means for moving air to be sampled through said ionizer section, and collecting chamber;

g) high voltage power supply means for providing said potential levels to said cathode and substrate; and

h) a rigid, airtight container with closable inlet and outlet ports, said container housing the foregoing elements a) through g), said container having a removable lid to provide access to said collector substrate.

11. The aerosol extractor of claim 10 wherein the tubular ionizer has a length in the range from about 2.0 inches to about 2½ inches and has a diameter in the range from about 1½ inches to about 2.0 inches.

12. The aerosol extractor of claim 10 including an external electrical receptacle

on said container surface, said receptacle being connected to said high voltage supply means and to said means for moving air and further including a battery external to said container with means for connecting to said receptacle.

13. The aerosol extractor of claim 10 including shutter means for closing said inlet and outlet with solenoid means for actuating said shutter means.

14. The aerosol extracts of claim 10 including storage means for additional collector plates.

15. A portable, compact aerosol contaminant extractor comprising:

a) a generally rectangular parallelepiped container having top, bottom, side, and end panels, the top panel being removable to permit access to the interior of the container, said container being air tight and manually portable by one person; the following elements being associated with or disposed within said container;

b) an inlet port formed in one end panel and an outlet port formed in the other end panel of the container whereby air to be sampled can flow into and out of said container;

c) an ionizer section in communication with said inlet port, said ionizer section comprising an ionizer ground tube having inlet and outlet ends, and an ionizer wire positioned in the longitudinal axis of said tube;

d) an ionizer high voltage power supply for supplying voltage to said ionizer wire at a potential sufficient to cause a coronal glow discharge in air passing through said tube;

e) a collector chamber for receiving air discharged from said ionizer tube, said chamber comprising ground plates with a removable collection substrate plate

positioned therebetween, said plates being positioned so that their planar surfaces are parallel to the direction of air flow;

f) a high voltage power supply for establishing and maintaining a potential difference between said substrate plate and said ground plates;

g) a fan for drawing air through the inlet port into the ionizer and through the collector chamber and discharging the air through said outlet port; and,

h) an access port in the top panel of said container, said port being located above the removable collector plate when said port is opened so that the collector plate can be withdrawn therethrough.

16. The aerosol contaminant extractor of claim 15 including closure shutters for said inlet and outlet ports, and solenoid means for actuating the shutters to open and close said ports.

17. The aerosol contaminant extractor of claim 15 including storage means for additional collector plates.

18. A method of extracting aerosol contaminants at diverse locations comprising the steps of:

a) providing an open ended, tubular ionizer for charging aerosol contaminants that pass therethrough;

b) passing air to be sampled through said ionizer;

c) after leaving the ionizer, passing the air sample over substrate having a charged plate-like surface positioned between the ground plates to collect charged particles on the charged collector plate;

d) removing the collector plate from between the grounded plates; and

e) analyzing the particles collected on said plate.

19. The method of claim 18 including the steps of:

- i) providing a portable container with air sample inlets and outlets and an access port;
- ii) securing said ionizer and said ground and collector plates within said container whereby when secured, the collector plate is aligned to receive the air discharged from said ionizer.

20. The method of claim 18 including the steps of moving said substrate into said extractor and after a predetermined period of time removing said substrate from said extractor.